

PROCESS FOR UPGRADING COGNITIVE ASSESSMENT CAPABILITIES ONBOARD THE INTERNATIONAL SPACE STATION

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MOTIVATION: Spaceflight poses varied and unique risks to the brain and cognitive functioning including radiation exposure, sleep disturbance, fatigue, fluid shifts (increased intracranial pressure), toxin exposure, elevated carbon dioxide, and traumatic brain injury, among others. These potential threats to cognitive functioning are capable of degrading performance and compromising mission success. Furthermore, the threats may increase in severity, and new types of threats may emerge for longer duration exploration missions. This presentation will describe the process used to identify gaps in our current approach, evaluate best practices in cognitive assessment, and transition new cognitive assessment tools to operational use.

OVERVIEW: Risks to brain health and performance posed by spaceflight missions require sensitive tools to assess cognitive functioning of astronauts in flight. The Spaceflight Cognitive Assessment Tool for Windows (WinSCAT) is the automated cognitive assessment tool currently deployed onboard the International Space Station (ISS). WinSCAT provides astronauts and flight surgeons with objective data to monitor neurocognitive functioning. WinSCAT assesses 5 discrete cognitive domains, is sensitive to changes in cognitive functioning, and was designed to be completed in less than 15 minutes. However, WinSCAT does not probe other areas of cognitive functioning that might be important to mission success. Researchers recently have developed batteries that may expand current capabilities, such as increased sensitivity to subtle fluctuations in cognitive functioning. Therefore, we engaged in a systematic process review in order to improve upon our current capabilities and incorporate new advances in cognitive assessment. This process included a literature review on newer measures of neurocognitive assessment, surveys of operational flight surgeons at NASA regarding needs and gaps in our capabilities, and expert panel review of candidate cognitive measures and assessment issues and procedures.

SIGNIFICANCE: Our process and the results that flowed from it may be helpful to aeromedical professionals charged with transitioning research findings to operational use. Our specific findings regarding cognitive assessment tools are of significance to professionals who must assess readiness to perform in mission critical situations in environments involving threats to cognition and performance.